Docket No.: 2000P07626US03 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	:	
	:	
PETERSON	:	Confirmation No. 3493
	:	
Serial No.: 10/807,336	:	Group Art Unit: 3752
	:	
Filed: March 24, 2004	:	Examiner: McGraw, Trevor

For: INJECTION VALVE WITH SINGLE DISC TURBULENCE GENERATION

MAIL STOP: APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

This is an appeal of the twice rejected claims 23-27 in the above-identified patent application.

This Appeal Brief is submitted as required by 37 C.F.R. §41.37.

1. Real Party in Interest:

The real party of interest is Continental Automotive Systems US, Inc.

2. Related Appeals and Interferences:

There are no other appeals or interferences known to Appellant that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of Claims:

Claims 16-27 are pending in this application, claims 16-22 are withdrawn from further consideration, claims 23-27 stand rejected by the Examiner and are appealed. Claims 1-15 are canceled.

4. Status of any Amendment Filed Subsequent to Final Rejection:

In response to the final Office Action dated January 26, 2010, a Response under Rule 116 was filed on March 9, 2010, which was considered by the Examiner as indicated in the Advisory Action of March 25, 2010.

5. Summary of Claimed Subject Matter:

The claimed subject matter includes independent claim 23 and dependent claims 24-27.

Independent claim 23 recites a method of controlling a spray of fuel flow through at least one metering orifice of a fuel injector. The method provides the fuel injector (item 10, FIG. 1), having an inlet (item 210, FIG. 1) and an outlet (item 220, FIG. 1) and a passage (item 262, FIG. 1) extending along a longitudinal axis therethrough (page 4, lines 13-19). The outlet has a seat (item 30, FIG. 2, page 5, lines 1-2) and a metering disc (item 50, FIG. 2, page 6, line 15). The seat has a seat orifice (item 320, FIG, 2, page 5, line 3-4) and a first channel surface (item 350, FIG. 2) extending obliquely to the longitudinal axis (page 7, lines 14-17). The metering disc includes a second channel surface (item 510, FIG. 2) confronting the first channel surface so as to provide a flow channel (item 560, FIG. 2) that is separate from but in communication with the seat orifice (page 7, lines 21-23). The metering disc has a plurality of metering orifices (items 530, FIG. 2) extending therethrough along the longitudinal axis and located about the longitudinal axis (page 6, lines 20-22). The metering orifices are in communication with the flow channel (page 7, line 25 to page 8 line 3). All of the metering orifices are located on a first virtual circle (FIG. 3) outside of a second virtual circle formed by a virtual extension of a sealing surface of the seat on the metering disc such that each of the metering orifices extends generally parallel to the longitudinal axis through the metering disc (FIG. 2, page 6, lines 20-25). A radial

velocity is imparted to the fuel flowing from the seat orifice through the flow channel so that fuel flows in transverse direction across and through the fuel metering orifices (page 8, lines 13-24).

Claim 24 adds that locating of the metering orifices includes spacing a first metering orifice at a first arcuate distance relative to a second metering orifice on the first virtual circle (FIG. 3, page 6, line 26 to page 7, line 2).

Claim 25 adds that imparting of a radial velocity to the fuel flow includes configuring the flow channel to extend between a first position and a second position, the first position being located at a first distance from the longitudinal axis and at a first spacing along the longitudinal axis relative to the second surface of the metering disc and the second position being located at a second distance from the longitudinal axis and a second spacing along the longitudinal axis from the second surface of the metering disc, such that a product of the first distance and first spacing is generally equal to a product of the second distance and second spacing (FIG. 2, page 8, line 25 to page 9, line 11).

Claim 26 adds that the imparting comprises increasing the radial velocity between the seat orifice and each of the metering orifices (page 9, lines 13-15).

Claim 27 adds that the imparting comprises decreasing the radial velocity between the seat orifice and each of the metering orifices (page 9, lines 13-15).

6. Grounds of Rejection to be Reviewed on Appeal:

Whether claims 23-27 are unpatentable under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,766,441to Arndt et al.

7. Arguments:

Claims 23-27 are patentable under 35 USC §102(b) as not being anticipated by U.S. Patent No. 5,766,441 to Arndt et al.

Claim 23 recites that the seat has a seat orifice and a first channel surface extending obliquely to the longitudinal axis. Thus, as shown in FIG. 2 of the specification presented below and as claimed, the first channel surface 350 of the seat together with the confronting second

channel surface 510 of the metering disc form a flow channel 560.

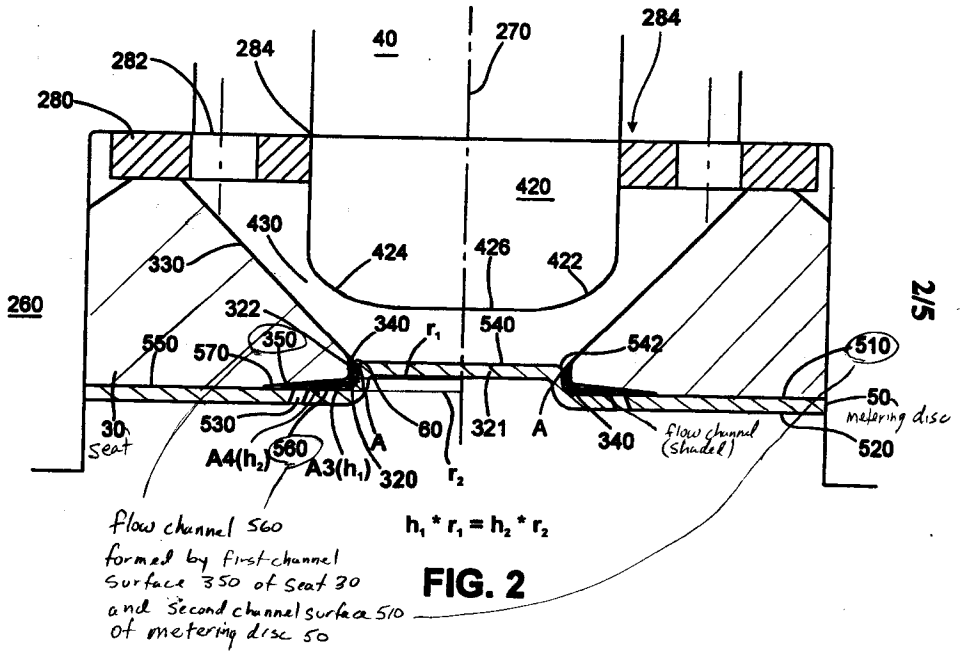
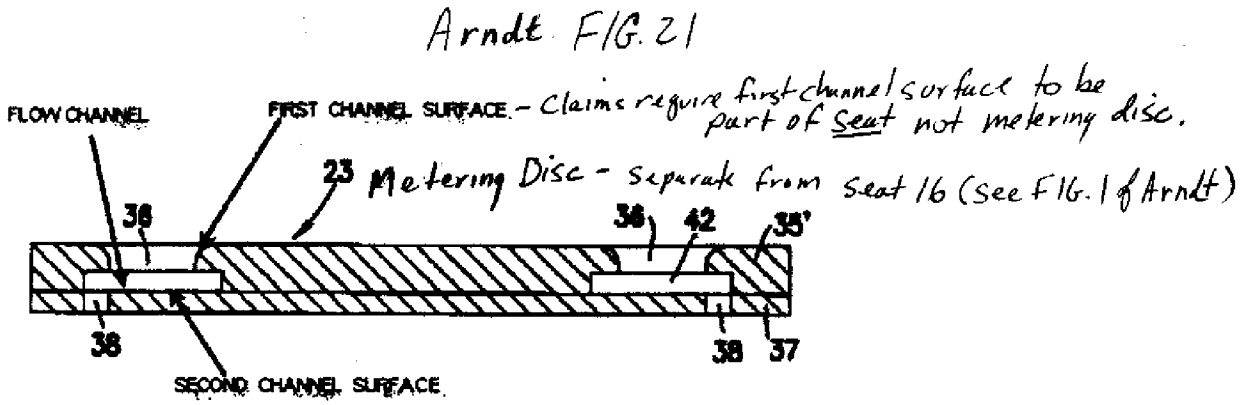


FIG. 2

The Examiner contends that Arndt et al. shows "the seat (29) having a first channel surface" and then describes the first channel surface to be the "curved surface of 35" which is part of the metering disc 23 (and thus not part of the seat 16, 29 as required by the claim). See the marked up FIG. 21 of Arndt et al. below that shows the first channel surface as interpreted by the Examiner as part of the metering disc 23. The seat and metering disc are claimed as separate elements and they are also separate elements as disclosed in Arndt et al. In the Advisory Action, the Examiner stated that "Examiner cannot agree with Applicant's arguments that the valve seat is apart of the metering disc." Arndt et al. does not disclose the seat 16 and orifice plate 23 (metering disc) are considered to be a common part. In fact, at column 4, lines 23-29, Arndt et al. discloses that the seat 16 and support plate 21 are joined, with the orifice plate (metering disc) 23 inserted into opening 22. Arndt et al. also discloses a method of mass producing orifice plates 23 "on a single wafer", thus providing further evidence that the orifice plate 23 (metering disc) cannot be considered to be part of the seat 16 of Arndt et al. (see Arndt et al., column 10, lines 23-32). Also, Arndt et al. discloses manufacturing metal orifice plates 23 with precision using

UV three-dimensional lithography followed by micro-electroplating (see column 10, lines 23-26). Thus, it is clear that the precision orifice 36 in layer 35' (defining the claimed first channel surface) in Arndt's FIG. 21 is required to be formed in the metering disc 23 and not in the seat 16.



Thus, Arndt et al. does not disclose a "seat having a seat orifice and a first channel surface extending obliquely to the longitudinal axis, the metering disc including a second channel surface confronting the first channel surface so as to provide a flow channel that is separate from but in communication with the seat orifice", since in Arndt et al., the first channel surface is part of the metering disc 23 and not of the seat 16 as required by the claim. The rejection fails to demonstrate that the applied reference discloses each and every element of the claim, *as arranged in the claim*. See MPEP 2131. "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). "Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim." *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984). Hence, it is not sufficient that a single prior art reference discloses each element that is claimed, but the reference also must disclose that the elements are arranged as in the claims under review. *In re Bond*, 15 USPQ2d 1566, 1567 (Fed. Cir. 1990) (citing *Lindemann Maschinenfabrik GmbH*).

Regarding claim 25, the claim recites "configuring the flow channel to extend between a first position and a second position, the first position being located at a first distance from the longitudinal axis and at a first spacing along the longitudinal axis relative to the second surface of the metering disc and the second position being located at a second distance from the longitudinal axis and a second spacing along the longitudinal axis from the second surface of the metering disc, such that a product of the first distance and first spacing is generally equal to a product of the second distance and second spacing". This is shown clearly in FIG. 2 of the present application by A4(h_2) and A3(h_1) and explained using the formula $2\pi r_1 h_1 = 2\pi r_2 h_2$ on page 9 of the specification. The Examiner merely recites claim 25 in his rejection and states that Arndt et al. teaches the features without explicitly explaining how or where Arndt et al. discloses the features. For example, there is no disclosure in Arndt et al. of a "product of the first distance and first spacing is generally equal to the product of the second distance and second spacing". This feature cannot merely be determined from a figure in Arndt et al., without further explanation. Such further explanation of the claimed formula is simply not disclosed in Arndt et al.

Thus, the rejection of claim 23, and the claims that depend there-from is improper and the Examiner's rejection should be reversed.

Conclusion

For the reasons set forth above, it is clear that Appellant's claims 23-27 are patentable over Arndt et al. It is respectfully requested that this appeal be granted and that the Examiner's rejections be reversed.

To the extent necessary, Appellant petitions for an extension of time under 37 C.F.R. 1.136 and 37 C.F.R. 41.37(e). Please charge any shortage in fees due in connection with the filing of this paper, including any missing or insufficient fees under 37 C.F.R. 1.17(a) or 41.20(b)(2), to Deposit Account No. 50-0687, under Order No. 31-356, and please credit any excess fees to such deposit account.

Respectfully submitted,

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May 17, 2010

CLAIM APPENDIX – CLAIMS ON APPEAL

LISTING OF CLAIMS:

1-15. (Canceled)

16. (Withdrawn) A fuel injector comprising:

a housing having an inlet, an outlet and a longitudinal axis extending therethrough;

a valve seat disposed proximate the outlet, the valve seat including a sealing surface, an orifice, and a first channel surface, the orifice having a first diameter;

a metering orifice disc located at the outlet, the metering orifice disc having a plurality of metering openings extending therethrough, a second channel surface confronting the first channel surface, the metering openings tangential to a virtual circle, the virtual circle having a diameter greater than the first diameter;

a needle being reciprocally located within the housing along the longitudinal axis between a first position wherein the needle is displaced from the valve seat, allowing fuel flow past the needle, and a second position wherein the needle is biased against the valve seat, precluding fuel flow past the needle; and a controlled velocity channel disposed between the first channel surface of the valve seat and the second channel surface of the metering orifice disc, the controlled velocity channel extending outwardly from the orifice to the plurality of metering openings, such that fuel flow is at a generally constant velocity between the orifice and the plurality of metering openings.

17. (Withdrawn) A fuel injector comprising:

a housing having an inlet, an outlet and a longitudinal axis extending therethrough;

a valve seat disposed proximate the outlet, the valve seat including a sealing surface and an orifice; a metering orifice disc located at the outlet, the metering orifice disc having a plurality of metering openings extending therethrough;

a closure member being reciprocally located within the housing along the longitudinal

axis between a first position wherein the closure member is displaced from the valve seat, allowing fuel flow past the closure member, and a second position wherein the closure member is biased against the valve seat, precluding fuel flow past the closure member; and

a flow channel formed between the orifice and the metering orifice disc, the channel extending between a first end and a second end, the first end disposed at a first radius from the longitudinal axis and spaced at a first distance from the metering orifice disc, the second end disposed at a second radius proximate the plurality of metering openings with respect to the longitudinal axis and spaced at a second distance from the metering orifice disc such that a product of the first radius and the first distance is equal to a product of the second radius and the second distance so as to maintain a generally constant velocity flow of fuel between the orifice and the metering orifice disc.

18. (Withdrawn) A fuel injector comprising:

a housing having an inlet, an outlet and a longitudinal axis extending therethrough;

a valve seat disposed proximate the outlet, the valve seat including a sealing surface and an orifice;

a metering orifice disc proximate the outlet, the metering orifice disc having a plurality of metering openings extending therethrough, the metering openings defining a first virtual circle greater than a second virtual circle defined by a projection of the sealing surface onto the metering orifice disc so that all of the metering openings are disposed outside the second virtual circle;

a closure member being reciprocally located within the housing along the longitudinal axis between a first position wherein the closure member is displaced from the valve seat, allowing fuel flow past the closure member, and a second position wherein the closure member is biased against the valve seat, precluding fuel flow past the closure member; and

a flow channel formed between the orifice and the metering orifice disc, the channel extending between a first end and second end, the first end disposed at a first radius from the longitudinal axis and spaced at a first distance from the metering orifice disc, the second end

disposed at a second radius proximate the plurality of metering openings with respect to the longitudinal axis and spaced at a second distance from the metering orifice disc such that a product of the first radius and the first distance is equal to a product of the second radius and the second distance so as to maintain a generally constant velocity flow of fuel between the orifice and the metering orifice disc.

19. (Withdrawn) A fuel injector comprising:

a housing having an inlet, an outlet and a longitudinal axis extending therethrough;

a valve seat disposed proximate the outlet, the valve seat including a sealing surface, an orifice, and a first channel surface;

a metering orifice disc proximate the outlet, the metering orifice including a second channel surface confronting the first channel surface, the metering orifice disc having a plurality of metering openings extending therethrough, the metering openings defining a first virtual circle greater than a second virtual circle defined by a projection of the sealing surface onto a metering orifice disc so that all of the metering openings are disposed outside the second virtual circle;

one of the first and second channel surfaces forming a tapered channel portion, the metering orifice disc having a plurality of metering openings extending therethrough, the metering openings defining a second virtual circle greater than the first virtual circle so that all of metering openings are disposed outside the first virtual circle;

a closure member being reciprocally located within the housing along the longitudinal axis between a first position wherein the closure member is displaced from the valve seat, allowing fuel flow past the closure member, and a second position wherein the closure member is biased against the valve seat, precluding fuel flow past the closure member; and

a flow channel formed by the first and second channel surfaces, the at least one channel extending in a radial direction from the longitudinal axis and having a changing cross-sectional area as the at least one channel extends outwardly from the orifice to the plurality of metering openings so that a flow path extending radially from the orifice of the seat in any one radial direction away from the longitudinal axis towards the metering orifice disc passes to one

metering opening.

20. (Withdrawn) A method of generating turbulence in a fuel flow through a fuel injector, the fuel injector having a first end and a second end extending along a longitudinal axis, the method including:

providing a fuel flow under pressure to the fuel injector;

opening a valve in the fuel injector and allowing the pressurized fuel to flow past the valve and into an orifice;

directing the fuel flow at an initial velocity from the orifice into a controlled velocity channel formed by a valve seat and a metering orifice disc, the fuel generally maintaining constant velocity through the controlled velocity channel, the controlled velocity generating turbulence within the fuel flow; and

directing the fuel flow through at least one orifice opening downstream of the controlled velocity channel and out of the fuel injector.

21. (Withdrawn) The method according to claim 20, wherein the controlled velocity channel tapers from a first height at an upstream end of the controlled velocity channel to a second height at a downstream end of the controlled velocity channel, the second height being smaller than the first height.

22. (Withdrawn) The method according to claim 21, wherein the first height is located at a first radius with respect to the longitudinal axis, the second height is located at a second radius with respect to the longitudinal axis such that a product of the first height and the first radius is substantially equal to a product of the second height and second radius.

23. (Previously Presented) A method of controlling a spray of fuel flow through at least one metering orifice of a fuel injector, the method comprising:

providing the fuel injector having an inlet and an outlet and a passage extending along a

longitudinal axis therethrough, the outlet having a seat and a metering disc, the seat having a seat orifice and a first channel surface extending obliquely to the longitudinal axis, the metering disc including a second channel surface confronting the first channel surface so as to provide a flow channel that is separate from but in communication with the seat orifice, the metering disc having a plurality of metering orifices extending therethrough along the longitudinal axis and located about the longitudinal axis, the metering orifices being in communication with the flow channel,

locating all of the metering orifices on a first virtual circle outside of a second virtual circle formed by a virtual extension of a sealing surface of the seat on the metering disc such that each of the metering orifices extends generally parallel to the longitudinal axis through the metering disc; and

imparting a radial velocity to the fuel flowing from the seat orifice through the flow channel so that fuel flows in transverse direction across and through the fuel metering orifices.

24. (Previously Presented) The method of claim 23, wherein the locating of the metering orifices includes spacing a first metering orifice at a first arcuate distance relative to a second metering orifice on the first virtual circle.

25. (Previously Presented) The method of claim 24, wherein the imparting of a radial velocity to the fuel flow includes configuring the flow channel to extend between a first position and a second position, the first position being located at a first distance from the longitudinal axis and at a first spacing along the longitudinal axis relative to the second surface of the metering disc and the second position being located at a second distance from the longitudinal axis and a second spacing along the longitudinal axis from the second surface of the metering disc, such that a product of the first distance and first spacing is generally equal to a product of the second distance and second spacing.

26. (Previously Presented) The method of claim 23, wherein the imparting comprises increasing

the radial velocity between the seat orifice and each of the metering orifices.

27. (Previously Presented) The method of claim 23, wherein the imparting comprises decreasing the radial velocity between the seat orifice and each of the metering orifices.

EVIDENCE APPENDIX

Not Applicable

RELATED PROCEEDINGS APPENDIX

Not Applicable